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10/551,147	09/22/2005	Robert Bruce Grant	M02B166	3951

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Edwards Vacuum, Inc.
2041 MISSION COLLEGE BOULEVARD
SUITE 260
SANTA CLARA, CA 95054

EXAMINER	
RIPA, BRYAN D	

ART UNIT	PAPER NUMBER
1795	

NOTIFICATION DATE	DELIVERY MODE
12/02/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LORETTA.SANDOVAL@EDWARDSVACUUM.COM

Office Action Summary	Application No.	Applicant(s)	
	10/551,147	GRANT ET AL.	
	Examiner	Art Unit	
	BRYAN D. RIPA	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 July 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 July 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

In response to the amendment received on July 9, 2009:

- claims 1-44 are presently pending
- the objection to the drawings is withdrawn
- the objections to claims 6, 26 and 28 are withdrawn
- the 35 U.S.C. § 112 rejections of claims 5 and 26 are withdrawn
- all prior art rejections are maintained

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1, 2, 4, 6–9, 11–13, 15–18, 24, 27, 28, 32–36, and 40–44 are rejected under 35 U.S.C. 102(b) as being anticipated by Gur et al. (U.S. Pat. No. 5,827,415) (hereinafter referred to as “GUR”).

Regarding claim 1, GUR teaches a contaminant molecule sensor capable of use in a vacuum environment (see col. 3 lines 14–24) wherein the sensor comprises an electrochemical cell (see figure 3 below) having a measurement electrode (sensing electrode 36), a reference electrode (33), a solid-state ionic species conductor (solid electrolyte 34) bridging the measurement electrode and the reference electrode, and a means for initiating the catalysis of the dissociation of the reference and contaminant molecules (see col. 4 lines 1–5, 29–37; col. 4 lines 48–54). See figure 3 below.

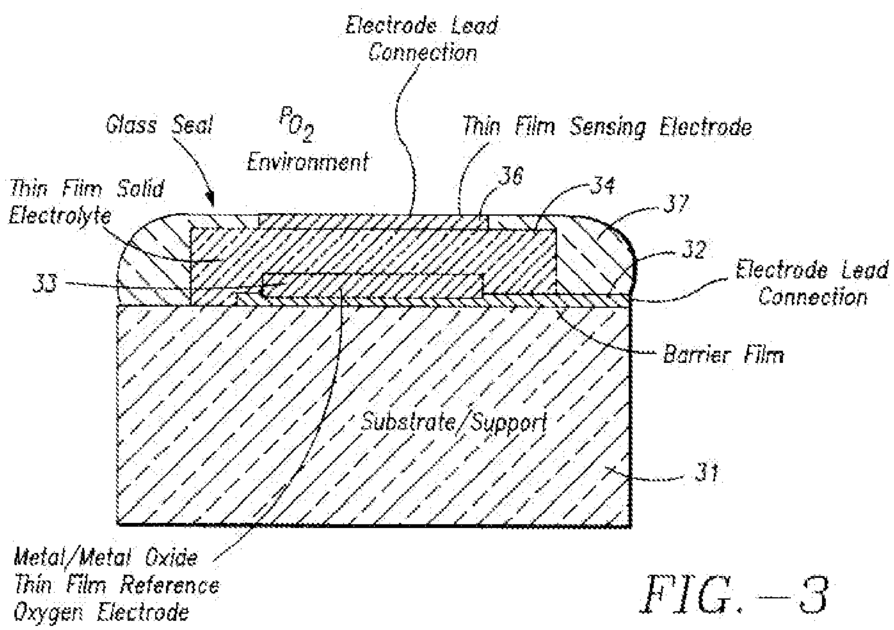


FIG. -3

Please note, the phrase "means for initiating catalysis of the dissociation of the reference and contaminant molecules" invokes 35 U.S.C. §112 6th paragraph. As a result, the examiner is interpreting the phrase in accordance with paragraphs 13 and 18 of the specification.

Regarding claims 2, 6 and 7, GUR teaches the contaminant molecule sensor wherein the means for initiating the catalysis of the dissociation of the reference and contaminant molecules comprises means for controlling and monitoring the temperature of the cell including a temperature sensor such as a thermocouple (see col. 4 lines 48–54 describing a suitable heater with a thermocouple attached so as to maintain the temperature of the cell within an optimum operating range).

Please note, the phrase “means for controlling and monitoring the temperature of the cell” invokes 35 U.S.C. §112 6th paragraph. As a result, the examiner is interpreting the phrase in accordance with paragraph 19 of the specification which describes the means for controlling and monitoring the temperature of the cell to entail a heater with a temperature sensor.

Regarding claim 4, GUR teaches the contaminant molecule sensor with the means for controlling and monitoring the temperature including an electrically powered heater (see col. 7 lines 4–9 discussing the use of a thin-film heater which necessarily is electrically powered).

Regarding claim 8, GUR teaches the contaminant molecule sensor having a vacuum feed-through connection for providing an electrical connection to the measurement electrode (see figure 3 above depicting the sensing electrode lead connection).

Regarding claim 9, GUR teaches the contaminant molecule sensor comprising seals for connection to a vacuum environment (see figure 3 above depicting the outer edge of the sensor).

Please note, the examiner is interpreting the word “seals” to include any physical barrier that separates a vacuum environment from an environment having a higher pressure, i.e. separating a vacuum chamber from the ambient atmosphere. Here, the outer surfaces of the sensor could act as “seals” when inserted into a hole of equal dimensions.

Regarding claim 11, GUR teaches the contaminant molecule sensor wherein the reference environment space (the space corresponding to reference electrode 33 in figure 3 above) is at least partially bounded by the reference electrode and is enclosed by a seal (see glass seal 37 in figure 3 above).

Regarding claim 12, GUR teaches the contaminant molecule sensor with the electrical cables for connecting the electrodes and optionally the electric heating means with an electrical circuit passing through the seal (see figure 3 above showing the electrode lead connections for both the reference and the sensing electrode passing through the glass seal).

Regarding claims 13 and 15, GUR teaches the contaminant molecule sensor having in the reference environment space a solid-state source of the reference material

comprising a metal and a metal oxide (see col. 4 lines 29–32 describing the metal-metal oxide material used as the solid-state source of the reference gas, i.e. a powder). GUR further teaches the ionic species to be conducted being O^{2-} and the solid-state source being a metal and a metal oxide material (see col. 2 lines 24–42).

Regarding claims 16–18, GUR teaches the contaminant molecule sensor wherein the metal is copper, chromium, or nickel and where the oxide is copper oxide, chromium oxide, or nickel oxide (see col. 7 lines 61–66).

Regarding claim 24, GUR teaches the contaminant molecule sensor having in the reference environment space a gaseous-state source of the ionic species (see col. 8 lines 4–17; col. 2 lines 24–42 describing how the metal/metal oxide layer acts to produce oxygen gas at a known pressure for a given temperature and, further, that the gaseous oxygen is then catalyzed to an ionic species after contacting the metal electrode surface).

Regarding claim 27, GUR teaches the contaminant molecule sensor wherein the solid-state ionic species conductor conducts O^{2-} ions (see the discussion above with respect to claim 15).

Regarding claim 28, GUR teaches the contaminant molecule sensor with the solid-state ionic species conductor comprising Yttria Stabilized Zirconia or YSZ (see col. 3 lines 65–68).

Regarding claims 32 and 33, GUR teaches the contaminant molecule sensor with the catalyst for the measurement electrode and the reference electrode being the same and further comprising platinum (see col. 4 lines 29–37; col. 4 lines 1–5 discussing the use of a platinum foil current collector to form the reference electrode and a platinum sensing electrode).

Regarding claim 34, GUR teaches the contaminant molecule sensor with the catalyst for the reference electrode comprising ruthenium (see col. 7 line 67 teaching the use of Ru/RuO for use in the reference electrode).

Regarding claim 35, GUR teaches the contaminant molecule sensor with the catalyst for the measurement electrode being gold (see col. 8 lines 25–26).

Regarding claim 36, GUR teaches the contaminant molecule sensor with the catalyst for the reference electrode comprising a catalyzing oxide (see col. 8 line 2 teaching the use of Pt/PtO for use in the reference electrode).

Regarding claim 40, GUR teaches a method of detecting and monitoring the presence of a contaminant molecule in a monitored environment comprising the steps of providing an electrochemical cell (see figure 3 above) with a measurement electrode comprising a catalyst selected for its ability to catalyze the dissociation of a contaminant molecule into its ionic species (sensing electrode 36; col. 2 lines 24–42), a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species (reference electrode 33; col. 2 lines 24–42), a solid-state ionic species conductor bridging the measurement electrode and the reference electrode with the conductor being selected to conduct an ionic species common to the dissociated contaminant and reference molecules (solid electrolyte 34; col. 5 lines 30–37), providing on a side of the cell bounded by the reference electrode a source of the reference molecules (see figure 3 above and discussion above with respect to claim 11), initiating the catalysis of the reference and contaminant molecules (see col. 4 lines 48–54), monitoring a parameter of an electrical current produced in the cell (col. 6 lines 64–67 discussing the monitoring of the potential difference between the two electrodes), and calculating from the monitored parameter the partial pressure of the contaminant molecule in an environment on the side of the cell bounded by the measurement electrode (see col. 2 lines 42–60 discussing the use of the Nernst equation to calculate the partial pressure of the unknown gas).

Regarding claim 41, GUR teaches the method of detecting and monitoring the presence of a contaminant molecule in a monitored environment wherein the monitored

parameter is electromotive force (see col. 6 lines 64–67 discussing the monitoring of the voltage, i.e. electromotive force, between the two electrodes).

Regarding claim 42, GUR teaches the method of detecting and monitoring the presence of a contaminant molecule in a monitored environment wherein catalysis of the contaminant molecule is initiated by heating the cell (see discussion above with respect to claim 2).

Regarding claim 43, GUR teaches the method of detecting and monitoring the presence of a contaminant molecule in a monitored environment where the reference molecule is the same as the contaminant molecule (see abstract discussing the contaminant molecule or the molecule to be measured and the reference molecule as oxygen).

Regarding claim 44, GUR teaches the method of detecting and monitoring the presence of a contaminant molecule in a monitored environment where the catalyst for the measurement electrode is the same as the catalyst for the reference electrode (see discussion above with respect to claim 32).

2. Claims 1–7 are rejected under 35 U.S.C. 102(b) as being anticipated by Flais et al. (U.S. Pat. No. 3,871,981) (hereinafter referred to as “FLAIS”).

Regarding claim 1, FLAIS teaches a contaminant molecule sensor capable of use in a vacuum environment wherein the sensor comprises an electrochemical cell (see figure 2 below) having a measurement electrode (electrode strip 22), a reference electrode (electrode strip 30), a solid-state ionic species conductor (electrolyte tube 16) bridging the measurement electrode and the reference electrode, and a means for initiating the catalysis of the dissociation of the reference and contaminant molecules (see col. 3 lines 48–50; col. 5 lines 42–55). See figure 2 below from FLAIS.

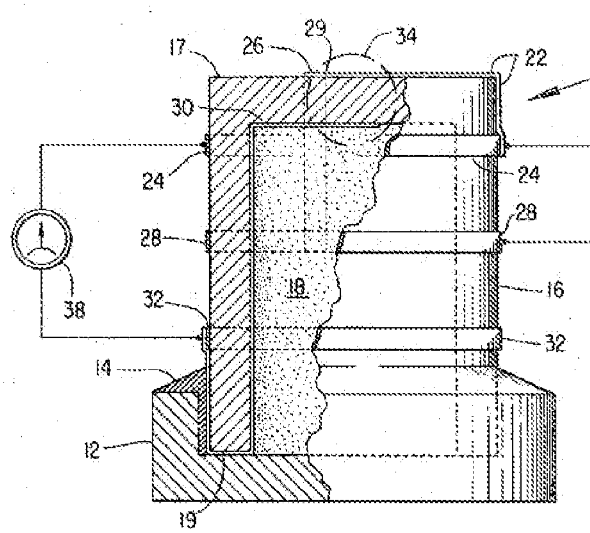


FIG. 2

Regarding claim 2, FLAIS teaches the contaminant molecule sensor wherein the means for initiating the catalysis of the dissociation of the reference and contaminant molecules comprises means for controlling and monitoring the temperature of the cell (see col. 5 lines 42–55 describing the use of the heater control element to operate the sensor at a set point temperature).

Regarding claim 3, FLAIS teaches the contaminant molecule sensor having a means for separating a reference environment space from a monitored environment space (see figure 5 below depicting the reference environment space as that space surrounded by detector jacket 60 on the bottom portion of the figure and the monitored environment space as unknown atmosphere chamber 71), where the means for controlling and monitoring the temperature of the cell includes a heating device contained within the reference environment space (see circumferential heater 66).

Please note, the phrase "means for separating a reference environment space from a monitored environment space" invokes 35 U.S.C. §112 6th paragraph. As a result, the examiner is interpreting the phrase in accordance with figure 2 of the specification.

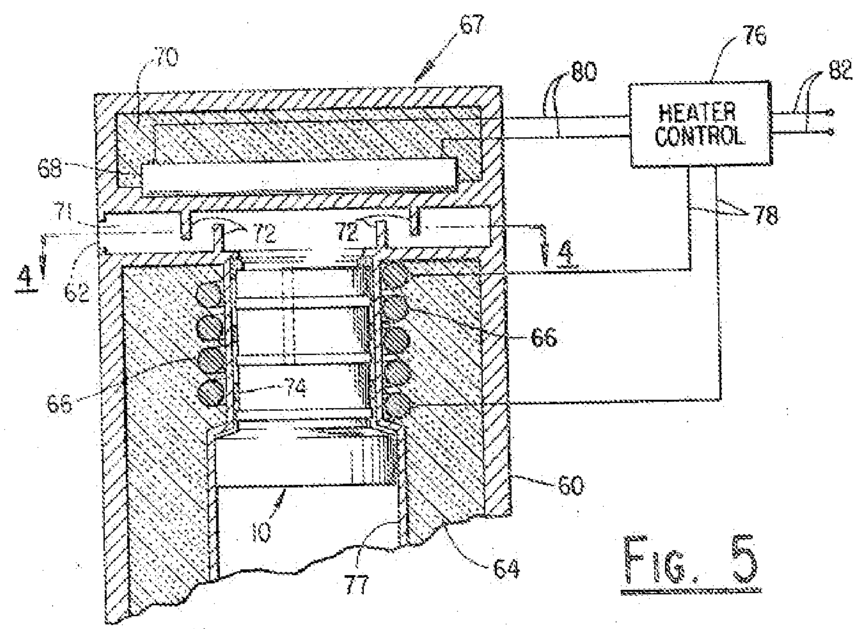


FIG. 5

Regarding claim 4, FLAIS teaches the contaminant molecule sensor with the means for controlling and monitoring the temperature including an electrically powered heater (see col. 6 lines 12–15).

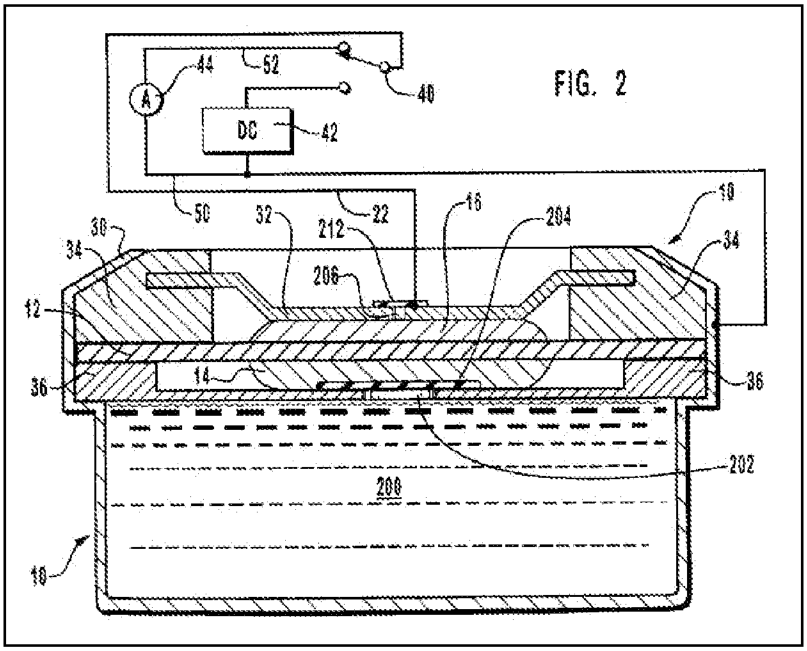
Regarding claim 5, FLAIS teaches the contaminant molecule sensor wherein the electrically powered heater comprises wire (see circumferential heater 66). See figure 5 above.

Regarding claims 6 and 7, FLAIS teaches the contaminant molecule sensor with the means for controlling and monitoring the temperature including a temperature sensor such as a thermocouple (see col. 3 lines 60–64).

3. Claims 1, 11, 21, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Shen et al. (U.S. Pat. No. 5,650,054) (hereinafter referred to as “SHEN”).

Regarding claim 1, SHEN teaches a contaminant molecule sensor capable of use in a vacuum environment wherein the sensor comprises an electrochemical cell (see col. 4 lines 20–28) having a measurement electrode (sensing electrode 16), a reference electrode (counter electrode 14), a solid-state ionic species conductor (protonic conductive membrane 12) bridging the measurement electrode and the reference electrode, and a means for initiating the catalysis of the dissociation of the reference and contaminant molecules (see col. 9 lines 14–40 discussing the making of

counter electrode 14 and sensing electrode 16 with a platinum thin film). See figure 2 below.



Regarding claim 11, SHEN teaches the contaminant molecule sensor wherein the reference environment space (the space surrounding reservoir 200) is at least partially bounded by the reference electrode (counter electrode 14) and is enclosed by a seal (see the configuration of washer 36 placed in can 30 in combination with cap 32 which act as a seal to enclose the reference environment space). See figure 2 above.

Regarding claims 21, SHEN teaches the contaminant molecule sensor having in the reference environment space a liquid state source of the ionic species (see col. 7

lines 3–5 discussing reservoir 200 being filled with deionized water providing hydrogen ions for the electrochemical detection of the analyte gas). See figure 2 above.

Regarding claim 25, SHEN teaches the contaminant molecule sensor where the solid-state ionic species conductor (protonic conductive membrane 12) conducts hydrogen ions. See figure 2 above from SHEN.

Regarding claim 26, SHEN teaches the contaminant molecule sensor where the solid-state ionic species conductor is NAFION (see col. 8 lines 26–30).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over GUR as evidenced by Sano et al. (U.S. Pat. No. 4,121,988) (hereinafter referred to as “SANO”).

Regarding claim 10, GUR teaches the reference environment space being at least partly bounded by the reference electrode (see figure 3 above and discussion above with respect to claim 11) and the reference environment space being open to the ambient atmosphere (see col. 2 lines 61–66 teaching it is old in the art to have the reference gas space open to the ambient atmosphere). Moreover, the sensor of GUR could be modified so as to function with the reference environment space being open to the atmosphere.

Consequently, as shown by GUR, a person of ordinary skill in the art would accordingly have recognized the possibility of having the reference environment space being open to the ambient atmosphere. SANO depicts an oxygen sensor similar to what GUR described as old in the art (see figure 1; col. 5 lines 18–23).

As such, one of ordinary skill in the art at the time of the invention would have recognized the use of the ambient atmosphere as a source of the reference gas as taught in GUR and SANO with the predictable result of providing the electrochemical gas sensor with the reference environment space being open to the ambient atmosphere.

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over GUR in view of Tiwari (U.S. Pat. No. 4,882,032) (hereinafter referred to as "TIWARI").

Regarding claim 14, GUR does not teach the ionic species being conducted is a hydrogen ion and the solid-state source selected from a metal, metal hydride, a metal alloy/metal hydride, any hydrated species and any organic species.

However, TIWARI teaches an electrochemical sensor where the ionic species being conducted is a hydrogen ion (col. 1 lines 63–65) and the solid state source is from a metal hydride (col. 3 lines 19–30) in the detection of hydrogen gas.

Consequently, as shown by TIWARI, a person of ordinary skill in the art would accordingly have recognized the use of a metal hydride as the solid state source of

hydrogen ions when attempting to develop a sensor for the detection of other analytes besides oxygen.

Applying a known technique to a known device (method or product) ready for improvement to yield predictable results is likely to be obvious. See *KSR Int'l Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, D.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the solid state source of TIWARI with the sensor of GUR to provide for the predictable result of having hydrogen ions being the ionic species to be conducted and having the solid state source comprising a metal hydride to facilitate the use of the sensor in broader sensing applications.

6. Claims 19, 20, 29–31 are rejected under 35 U.S.C. 103(a) as being unpatentable over GUR in view of Hitchman et al. (U.S. Pat. No. 6,365,022) (hereinafter referred to as "HITCHMAN").

Regarding claims 19, 20 and 29–31 GUR does not teach the ionic species to be conducted being silver ions and the solid state source being a silver salt.

However, HITCHMAN teaches the ionic species to be conducted being silver ions (see col. 2 lines 22–23) and the solid state source being a silver salt (see col. 3 lines 2–3 describing the solid state source as a silver salt) in the electrochemical detection of carbon dioxide.

Consequently, as shown by HITCHMAN, a person of ordinary skill in the art would accordingly have recognized the use silver ions as the ionic species to be conducted and the use of a silver salt as the solid state source when attempting to develop a sensor for the detection of other analytes besides oxygen.

Applying a known technique to a known device (method or product) ready for improvement to yield predictable results is likely to be obvious. See *KSR Int'l Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, D.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to incorporate the solid state source of HITCHMAN with the sensor of GUR to provide for the predictable result of having silver ions being the ionic species to be conducted and the solid state source being a silver salt to facilitate the use of the sensor in broader sensing applications.

7. Claims 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over SHEN in view of Stetter et al. (U.S. Pat. No. 5,331,310) (hereinafter referred to as "STETTER").

Regarding claim 22, although SHEN does teach the ionic species being conducted being a hydrogen ion, SHEN does not teach the liquid state source of the ionic species comprising a liquid acid.

However, STETTER teaches the use of sulfuric acid as a liquid state source of the ionic species (see col. 4 lines 25–26).

Consequently, as shown by STETTER, one of ordinary skill in the art would accordingly have recognized the use of the liquid state source being a liquid acid.

The combination of familiar elements is likely to be obvious when it does no more than yield predictable results. See *KSR Int'l Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, A.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the liquid state source of SHEN with the liquid state source of STETTER to obtain the predictable result of providing hydrogen ions through having the liquid state source of the ionic species being a liquid acid.

Regarding claim 23, SHEN as modified by STETTER does not teach the liquid state source of the hydrogen ions being an organic liquid.

However, one of ordinary skill in the art would have been aware of the possibility of using an organic liquid, i.e. an organic acid, instead of an inorganic acid as taught by STETTER.

Consequently, a person of ordinary skill in the art would accordingly have recognized the use of either an organic acid or an inorganic acid based on the disclosure of STETTER.

The simple substitution of one known element for another is likely to be obvious when predictable results are achieved. See *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, B.). Furthermore, the selection of a known material, which is based upon its suitability for the intended use, is within the ambit of one of ordinary skill in the art. See *In re Leshin*, 125 USPQ 416 (CCPA 1960) (see MPEP § 2144.07).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the inorganic acid of STETTER with an organic acid as the liquid state source of the hydrogen ions.

8. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over GUR in view of Razumney (U.S. Pat. No. 4,370,206) (hereinafter referred to as “RAZUMNEY”).

Regarding claim 37, GUR does not teach one of the catalysts comprising a silver salt.

However, RAZUMNEY teaches the catalyst comprising a silver salt (see abstract).

Consequently, as shown by RAZUMNEY, a person of ordinary skill in the art would accordingly have recognized the use of a catalyst comprising a silver salt to facilitate the electrochemical detection of the analyte gas.

The simple substitution of one known element for another is likely to be obvious when predictable results are achieved. See *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, B.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the catalyst of GUR for the catalyst of RAZUMNEY in order to obtain the predictable result of providing an appropriate material, a silver salt, to favor dissociation of the ions of interest.

9. Claims 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over GUR.

Regarding claim 38, GUR teaches the contaminant molecule sensor having a means for monitoring a parameter of an electrical current produced in the cell (see figure 3 above depicting the sensing and reference electrode lead connections), but does not explicitly teach a means for calculating from the monitored parameter the partial pressure of the contaminant molecule in an environment on a side of the cell bounded by the measurement electrode relative to that on a side of the cell bounded by the reference electrode by the use of a microprocessor.

While GUR does not explicitly disclose the use of a microprocessor in connection with the use of the electrochemical sensor, it is notoriously well known in the art to do so.

Consequently, a person of ordinary skill in the art would have accordingly have recognized the possibility of connecting the voltage sensing means to a microprocessor so as to enable the user to continuously monitor the gas concentration.

The combination of familiar elements is likely to be obvious when it does no more than yield predictable results. See *KSR Int'l Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1395–97 (2007) (see MPEP § 2143, A.).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to combine a microprocessor with the voltage sensing means disclosed in GUR to obtain the predictable result of incorporating a microprocessor as a means for calculating from the monitored parameter the partial pressure of the contaminant molecule to facilitate a faster means of obtaining a concentration of the analyte gas.

Please note, the phrase "means for monitoring a parameter of an electrical current produced in the cell" invokes 35 U.S.C. §112 6th paragraph. As a result, the examiner is interpreting the phrase in accordance with paragraph 35 of the specification.

Please note also, the phrase "means for calculating from the monitored parameter the partial pressure of the contaminant molecule in an environment on a side of the cell bounded by the measurement electrode relative to that on a side of the cell bounded by the reference electrode" invokes 35 U.S.C. §112 6th paragraph. As a result, the examiner is interpreting the phrase in accordance with paragraphs 37–39 of the

specification which discusses the use of a microprocessor to calculate the partial pressure of the contaminant molecule.

Regarding claim 39, GUR teaches the monitoring means comprising an emf measuring device electrically coupled to the reference and measuring electrodes (see col. 6 lines 64–67 discussing the connection of the leads to a voltage sensing device).

Response to Arguments

Applicant's arguments filed on July 9, 2009 have been fully considered but they are not persuasive.

Applicant argues that:

“Gur fails to teach or suggest "a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species." In Gur, the reference electrode 13 is consisted of a metal/metal-oxide binary mixture. See, col. 4, lines 6-8. The reference electrode 13 acts as a self-contained reference of oxygen level determined by chemical equilibrium between its metal and metal oxide components. See, col. 5, lines 2-6. In other words, the reference electrode 13 is a source of oxygen, instead of a catalyst that catalyzes a source to release oxygen.” See Remarks page 12.

While the examiner acknowledges some differences between the sensor of GUR and applicant’s disclosed invention, the examiner respectfully disagrees with applicant’s

contention that the reference electrode of GUR fails to comprise a catalyst capable of catalyzing the dissociation of the reference molecule into its ionic species. Specifically, while GUR teaches the reference electrode containing a binary metal/metal-oxide mixture, GUR also teaches the electrode comprising a platinum or gold barrier layer both of which are capable of catalyzing the dissociation of oxygen into its ionic species as claimed (see col. 5 lines 49-51 and col. 6 lines 21-24).

Additionally, in order for the sensor of GUR to function it is required for the reference electrode to be made of a material capable of acting to dissociate the oxygen reference gas into its ionic species. As stated by the applicant, the binary metal/metal-oxide mixture is a source of the reference oxygen gas (see applicant's remarks outlined above; see also GUR col. 8 lines 8-16 teaching the various oxygen partial pressures produced by various prior art binary metal/metal-oxide mixtures). The known partial pressure of the reference gas is then used in the Nernst Equation with the measured EMF that results due to the dissociation of oxygen molecules at both the measurement and reference electrodes as outlined in GUR to calculate the concentration of the unknown gas (see col. 2 lines 43-60).

Incidentally, applicant's specification also discloses an embodiment in which a binary metal/metal-oxide mixture is used as a source of the reference gas (see ¶16 disclosing the use of a solid state source of the reference gas) which functions in the same manner.

Please note that the limitations stating the catalyst "selected for its ability to catalyze the dissociation of a contaminant/reference molecule into its ionic species" in

lines 4-9 of claim 1 are being treated as functional limitations. See MPEP § 2114. Consequently, the examiner is interpreting the claim as merely requiring the presence of a catalyst that is capable of acting to dissociate the molecules as claimed and not as requiring the sensor to operate in that fashion.

Applicant also argue that:

"Flais fails to teach or suggest the claimed features, "a measurement electrode comprising a catalyst selected for its ability to catalyze the dissociation of a contaminant molecule into its ionic species, and a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species." As a result, although Flais' sensor may work in an atmospheric environment, it won't necessarily function well in a high vacuum environment." See Remarks page 14.

While the examiner acknowledges some differences between the sensor of FLAIS and applicant's disclosed invention, the examiner respectfully disagrees with applicant's contention that the measurement and reference electrodes of FLAIS do not comprise a catalyst capable of catalyzing the dissociation of the measurement and reference molecules respectively into their ionic species. Specifically, FLAIS teaches the electrode strips 22 and 30 functioning as the measurement and reference electrodes as being made of platinum which is known to catalyze the dissociation of oxygen into its ionic species as claimed (see col. 3 lines 48-50).

Furthermore, applicant's arguments relating to the differences between the mathematic expressions used as the basis for determining the concentration of the unknown gas are irrelevant to the issue of whether the sensor as claimed is

distinguishable over the prior art since the arguments do not accurately reflect and are not consistent with the scope of the claims.

Applicant also argues that:

"Shen fails to teach or suggest "a reference electrode comprising a catalyst selected for its ability to catalyze the dissociation of a reference molecule into its ionic species." As clearly shown in FIG. 1 of Shen, the reference electrode 14 associates ionic species into reference molecules, instead of the other way around." See Remarks page 15.

While the examiner acknowledges some differences between the sensor of SHEN and applicant's disclosed invention, the examiner respectfully disagrees with applicant's contention that the reference electrode of SHEN does not comprise a catalyst capable of catalyzing the dissociation of reference molecules into their ionic species. Specifically, SHEN teaches the counter electrode 14 being made of platinum which is known to catalyze the dissociation of oxygen into its ionic species as claimed (see col. 9 lines 37-38).

Consequently, as discussed above, due to the scope of the claim as presently presented it is still the examiner's opinion that the sensor of SHEN reads on the sensor as claimed.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRYAN D. RIPA whose telephone number is 571-270-7875. The examiner can normally be reached on Monday to Friday, 9:00 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Harry D Wilkins, III/
Primary Examiner, Art Unit 1795

/B. D. R./
Examiner, Art Unit 1795